White pine blister rust.—The present state of our knowledge concerning this most important tree rust is ably summarized by SPAULDING[7] in a recent contribution from the Bureau of Plant Industry. The extensive scope of the treatment is partially indicated by the bibliography of 180 titles. The opinion is expressed that *Cronartium ribicola* is of Asiatic origin, that it spread throughout Europe during the nineteenth century, and was introduced into North America on young trees of *Pinus Strobus* after 1900. The life history of the fungus and its relations with its various hosts are exhaustively discussed. It is regarded as established that the overwintering is chiefly by the mycelium in the bark of living pines, and that it is in this stage that the long migrations have taken place, but it is also recognized that the fungus may overwinter on *Ribes*. The attempts which have been made to control the disease are reviewed, and the conclusion is reached that its eradication is impossible except in the case of small isolated advance infections, but that the systematic removal of all *Ribes* in white pine forest areas will keep the disease in check, and that this method is both practicable and profitable.

ERIKSSON[8] renews his contention that the Peridermiums on *Pinus Strobus*, *P. silvestris*, and *P. Cembra* are biological races of a single species in which the specialization is not yet definitely fixed. He believes that he has evidence that the white pine blister rust is transmitted by diseased seed and also from pine to pine. The direct evidence presented is not of the sort that can be regarded as final. To supplement it, so far as the matter of the spread from pine to pine is concerned, great emphasis is laid upon the undoubted autoecism of closely related species, with particular stress upon the results of HAACK. These, it is interesting to note, are characterized as worthless by SPAULDING. The latter admits, however, that the work of MEINECKE and of HEDGCOCK on *Peridermium cerebrum*, and that of KLEBAHN on *Peridermium pini* "throw doubt on the strict heteroecism of the aeciospores of all stem-inhabiting pine Peridermiums." This is very far from proving the autoecism of the aecidiospores of *Peridermium strobi*, as ERIKSSON seems to assume. The point is obviously one of fundamental importance, and it is to be hoped that the experiments now under way in this country will shortly throw more light upon it. ERIKSSON finds in recent American and European experiences of the overwintering of the fungus on *Ribes* a complete justification of his own early expressed belief concerning this phase of the problem. That such overwintering occurs cannot longer be doubted. That it is of any great importance in the perpetuation of the disease is still very questionable.—G. W. MARTIN.

Isoetes.—OSBORN[9] has obtained some very interesting results from an investigation of *Isoetes Drummondii*, a species widely distributed in certain

[7] SPAULDING, PERLEY, Investigations of the white pine blister rust. Bull. 957. U.S. Dept. Agric. pp. 100. *pls. 6. figs. 13.* 1922.

[8] ERIKSSON, JAKOB, The connection between *Peridermium strobi* Kleb. and *Cronartium ribicola* Dietr., is it obligate or not? A critical review. Arkiv Botanik **18**[2]: 1–40. *figs. 6.* 1922.

[9] OSBORN, T. G. B., Some observations on *Isoetes Drummondii* A. Br. Ann. Botany **36**:41–54. *figs. 15.* 1922.

parts of South Australia. "It grows terrestrially in seasonal swamps during the period of winter rainfall. During the dry summer it aestivates, as do the other geophytes with which it is associated." The stock is buried, and during the vegetative season only a small rosette of linear leaves is visible above the soil. On approach of the dry season, the leaves dry up and become detached, leaving their tough bases and sporangia upon the stock, wholly buried and invisible.

This species seems to be unique among Pteridophytes in its method of spore liberation. There is a special mechanism for freeing the spores which depends for its action upon saturation with water, not upon dryness (as in other Pteridophytes). Other peculiar features of the species are in the nature of preparation for this remarkable method of spore dispersal. In his summary, OSBORN describes the performance as follows: "Early in the rainy season, the hardened bases of the sporophylls are forced above the surface of the soil in a projectile-like mass, carrying with them the sporangia, by the expansion of certain pads of mucilage cells formed at the close of the previous vegetative season on the extreme bases of the sporophylls and from the superficial cells of the leaf-bearing cortex. About the same time the leaves of the new vegetative season begin to appear. The imbricate mass of sporophyll bases breaks up upon the surface of the soil, and the spores are set free by a tearing away of the sporangium wall from its attachment to the sporophyll when sodden. This is due to a difference between the tension of the inner and outer surfaces of the sporangium wall when saturated, and results in an eversion of the wall."

TAKAMINE[10] has investigated the gametophytes of *Isoetes japonica* and *I. asiatica*, with some interesting results. The female gametophyte of *I. japonica* usually has five or six archegonia, but sometimes ten or more. When fertilization occurs in one of them, the others degenerate; but in rare cases when fertilization occurs in two or more archegonia, several embryos are developed up to certain stages. Occasionally megaspores and microspores were found in the same sporangium. In *I. asiatica* the *2x* chromosome number is twenty-two, while in *I. japonica* it is "forty-three to forty-five." Hybrids of the two species were produced, an account of which is promised later.—J. M. C.

Complexmutation.—As the term mutation is now being used by geneticists, its application is restricted to "locus changes" on the chromosomes. At one place on one chromosome, mutation takes place, the effect of the change being so restricted as to involve only a single factor; other factors, although lying very close on the same chromosome, remain unchanged. Save for "deficiency," noted by BRIDGES[11] (which is evidently of a different category), all mutation seems to have been of this very localized type. It is perhaps surprising that no clear cases of mutations involving simultaneous changes in

[10] TAKAMINE, N., Some observations in the life history of *Isoetes*. Bot. Mag. Tokyo **35**: 184–190. *figs. 9*. 1921.

[11] BRIDGES, C. B., Deficiency. Genetics **2**: 445–465. 1917.